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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,649	05/27/2005	Takayuki Mizuno	14321.75	2202

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EXAMINER	
MOONEY, MICHAEL P	

ART UNIT	PAPER NUMBER
2883	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No.	Applicant(s)	
	10/536,649	MIZUNO ET AL.	
	Examiner	Art Unit	
	MICHAEL P. MOONEY	2883	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-7,9-13,15-27,29-37,39-42,85,87,89,91,93,95,97,99,101 and 103* is/are pending in the application.

4a) Of the above claim(s) *43-84,86,88,90,92,94,96,98,100,102 and 104* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-7,9-13,15-27,29-37,39-42,85,87,89,91,93,95,97,99,101 and 103* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/9/07, 1/8/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The cancellation of claims 1, 8, 14, 28, 38 is acknowledged.

Election/Restrictions

Applicant's election without traverse of claims 2-7, 9-13, 15-27, 29-37, 39-42, 85, 87, 89, 91, 93, 95, 97, 99, 101, and 103 in accordance with the reply filed on 4/11/07 is acknowledged.

Drawings

Figures 37-40, 41A, and 41B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 2-7, 9-13, 15-27, 29-37, 39-42, 93, 95, 99 are rejected under 35 U.S.C 102b as being anticipated by Tsutomu et al. (Tsutomu Kitoh et al.: "Novel Broad-Band Optical Switch Using Silica-Based Planar Lightwave Circuit" IEEE Photonics Technology Letters).

Tsutomu et al. teaches an interferometer optical switch (e.g., fig. 1, Abstract) comprising an optical waveguide circuit including: a first optical multi/demultiplexing device (e.g., 3dB WINC to the left of the main phase shifter in fig. 1); an optical delay line (e.g., the line containing the main phase shifter and the line parallel to and directly above the line containing the main phase shifter in fig. 1) including two optical waveguides connected to said first optical multi/demultiplexing device (fig. 1); a second optical multi/demultiplexing device (e.g., 3dB WINC to the right of the main phase shifter/optical-delay-line in fig. 1) connected to said optical delay line; one or more input waveguides connected to said first optical multi/demultiplexing device (fig. 1); one or more output waveguides connected to said second optical multi/demultiplexing device (fig. 1); and a phase shifter installed in said optical delay line (e.g., see "main phase shifter" in fig. 1), and wherein at least one of said first optical multi/demultiplexing device and said second optical multi/demultiplexing device is a phase generating coupler, which produces a wavelength-dependent phase difference (e.g., fig. 1; see page 735 the 1st full paragraph in col. 2); and wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.,pi..phi..sub.2(.lamda.) is the

phase produced by the second optical multi/demultiplexing device, the phase produced by the first and second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive (e.g., fig. 1; see page 735 the 1st full paragraph in col. 2).

The sum "{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda.)}" stated in the paragraph above is inherent to Tsutomu et al. since Tsutomu et al. teaches, in reference to Tsutomu et al.'s figure 1, a wavelength insensitive device at least by stating the "wavelength dependence can be compensated for by operating two subphase shifters" in the 1st full paragraph in col. 2 on page 735. Furthermore Tsutomu et al. figure 1 teaches substantially identical structure to at least figure 1 in the instant Application (IA) at least as is delineated above. (See MPEP 2112.01 re: inherency). Since the claimed and prior art products are identical or substantially identical in structure or composition (e.g., as delineated above)...a prima facie case of .... anticipation ... has been established. (See MPEP 2112.01 re: inherency).

Thus claim 2 is met.

It is noted that the reasoning for why inherency exists in the Tsutomu et al. reference is that one of ordinary skill realizes that the structure presented by the Tsutomu et al. reference enables the performance of all of the functions and/or the demonstration of all the properties stated in the claim mentioned above and in all the remaining claims. For example, the two WINCs along with the main phase shifter

region configuration of Tsutomu et al. fig. 1 enable the control of the phase such that the properties/functions claimed exist in and/or are performed by the Tsutomu et al. device.

One of ordinary skill recognizes that the all of the claimed functions/parameters are necessarily present in the disclosure of Tsutomu et al.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 2 wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer) [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 3 is met.

Tsutomu et al. inherently teaches wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal throughout an entire wavelength region. [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 4 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 2 wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l-amda.)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity . [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 5 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 2 wherein the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength [e.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 6 is met.

Tsutomu et al. teaches wherein said phase generating coupler is configured by connecting optical couplers and optical delay lines [e.g., fig. 1; page 735 the "II. WINS Design" section]. Thus claim 7 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 7 wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first

optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer) [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 9 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 4 wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l-amda.)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 10 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 2 wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l-amda.)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity . [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed

properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 11 is met.

Applicant is advised that should claim 5 be found allowable, claim 11 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 7 wherein the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength [e.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 12 is met.

Tsutomu et al. teaches the interferometer optical switch as claimed in claim 7, wherein said phase generating coupler comprises N+1 optical couplers (N is a natural number), and N optical delay lines that connects adjacent optical couplers of said N+1 optical couplers [e.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Thus claim 13 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 13 wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer) [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 15 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 13 wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 16 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 13 wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling

ratio of said second optical multi/demultiplexing device is made unity . [e.g., fig. 1; see page 735 the "II. WINS Design" section]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 17 is met.

Tsutomu et al. inherently teaches the interferometer switch as claimed in claim 13 wherein the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength [e.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 18 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 7, wherein one of said first optical multi/demultiplexing device and said second optical multi/demultiplexing device is an optical coupler with a phase difference 2.pi..phi..sub.c (constant) [e.g., fig. 1, see one of the 3dB WINCs], and the other is a phase generating coupler that is composed of two optical couplers (e.g., fig. 1, see one of the 3dB WINCs, each WINC contains two optical couplers) and an optical delay line (see around where the main phase shifter is in fig. 1) placed between said two optical couplers, and has a phase difference 2.pi..phi.(.lamda.), and wherein assuming that .DELTA.L is the optical path length difference of the optical delay line, and m is an integer, then the power coupling ratios of the two optical couplers constituting said

phase generating coupler, and the optical path length difference of the optical delay line are set to satisfy .phi.(.lamda.)=.DELTA.L/.lamda.+m/2-.phi..sub.c (11). [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 19 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 19, wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA.L(.lamda.)+.phi..sub.2(.lamda.)} becomes wavelength insensitive, and wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal throughout an entire wavelength region. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is

substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 20 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 19, wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive, and wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 21 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 19, wherein the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)}is set such

that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 22 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 7, wherein said first optical multi/demultiplexing device and said second optical multi/demultiplexing device are both a phase generating coupler comprising two optical couplers and a single optical delay line placed between said two optical couplers, and wherein power coupling ratios of the two optical couplers and an optical path length difference of the optical delay line that constitutes the first and second optical multi/demultiplexing device are set such that the sum of the phase difference 2.pi..phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference 2.pi..phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device satisfies .phi..sub.1(.lamda.)+.phi..sub.2(.lamda.)=.DELTA.L/.lamda.+m/2 (12) where .DELTA.L is the optical path length difference of said optical delay line, and m is an integer. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 23 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 23, wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive, and wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal throughout an entire wavelength region. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 24 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 23, wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase

produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive, the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 25 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 23, wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device, the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference

is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 26 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 7, wherein said first optical multi/demultiplexing device and said second optical multi/demultiplexing device are both a phase generating coupler comprising N+1 optical couplers (N is a natural number), and N optical delay lines each of which is composed of a first and second optical waveguides, and which connects adjacent optical couplers of the N+1 optical couplers, and wherein the sum of the optical path length satisfies either .SIGMA.l.sub.1,1>.SIGMA.l.sub.2,1 and .SIGMA.l.sub.1,2>.SIGMA.l.sub.2,2) or (.SIGMA.l.sub.2,1>.SIGMA.l.sub.1,1 and .SIGMA.l.sub.2,2>.SIGMA.l.sub.1,2), where .SIGMA.l.sub.1,1 is the sum of optical path lengths of the first optical waveguide constituting the N optical delay lines of said first optical multi/demultiplexing device, .SIGMA.l.sub.2,1 is the sum of optical path lengths of the second optical waveguide, .SIGMA.l.sub.1,2 is the sum of optical path lengths of the first optical waveguide constituting the N optical delay lines of said second optical multi/demultiplexing device, and .SIGMA.l.sub.2,2 is the sum of optical path lengths of the second optical waveguides constituting the N optical delay lines of said second optical multi/demultiplexing device. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 27 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 27, wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer). [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 29 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 27, wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 30 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 27, wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power

coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 31 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 27, the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 32 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 27, wherein the power coupling ratios of the N+1 optical couplers of said first optical multi/demultiplexing device are made equal to the power coupling ratios of the N+1 optical couplers of said second optical multi/demultiplexing device. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 33 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 33, wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer), wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive, and wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal throughout an entire wavelength region. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 34 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 33, wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer); wherein assuming that .lamda. is the wavelength, 2.pi..phi.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive, and wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity. [E.g., fig. 1; see pages 735-736 the “II. WINS Design” section & “III. Experiments”]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 35 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 33, wherein assuming that optical wavelength is .lamda., a phase difference between light output from said first optical multi/demultiplexing device is 2.pi..phi..sub.1(.lamda.), a phase difference caused by an optical path length difference .DELTA.L of said optical delay line is 2.pi..phi..DELTA..sub.L(.lamda.), and a phase difference between light output from said second optical multi/demultiplexing device is 2.pi..phi..sub.2(.lamda.), then the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} of the three phase differences is set such that output intensity of said optical waveguide circuit becomes constant for the wavelength .lamda.. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 36 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 7, wherein said first optical multi/demultiplexing device and said second optical multi/demultiplexing device each consist of a phase generating coupler including N+1 optical couplers (N is a natural number), and N optical delay lines sandwiched between adjacent said optical couplers of said N+1 optical couplers, and wherein the power coupling ratios of the N+1 optical couplers of said first optical multi/demultiplexing device are made equal to the power coupling ratios of the N+1 optical couplers of said second optical multi/demultiplexing device. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu

et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 37 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 37, wherein the sum of the phase difference .phi..sub.1(.lamda.) of the output of said first optical multi/demultiplexing device and the phase difference .phi..sub.2(.lamda.) of the output of said second optical multi/demultiplexing device equals .DELTA.L/.lamda.+m/2 (m is an integer). [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 39 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 37, wherein the sum 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at (2m'+1).pi. (m' is an integer), and the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device are made equal. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 40 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 37, wherein the sum

2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.l- amda.)} of the three phase differences is set at 2m'.pi. (m' is an integer), and the sum of the power coupling ratio of said first optical multi/demultiplexing device and the power coupling ratio of said second optical multi/demultiplexing device is made unity. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 41 is met.

Tsutomu et al. inherently teaches the interferometer optical switch as claimed in claim 37, wherein the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} is set such that the output intensity of said optical waveguide circuit becomes uniform with respect to wavelength. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01]. Thus claim 42 is met.

Tsutomu et al. teaches wherein said optical coupler consists of a directional coupler including two optical waveguides placed side by side in close proximity (e.g., fig. 1). Thus claim 93 is met.

Tsutomu et al. teaches wherein said phase shifter consists of a thin film heater formed on the optical waveguide (e.g., fig. 1; the left column of page 736). Thus claim 95 is met.

Tsutomu et al. teaches wherein said optical waveguide circuit is made of a silica-based glass optical waveguide (e.g., the left column of page 735 in the 2nd paragraph of the Introduction). Thus claim 99 is met.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 85, 87, 89, 91, 97, 101, 103 are rejected under 35 U.S.C 103a as being unpatentable over Tsutomu et al. (Tsutomu Kitoh et al.: "Novel Broad-Band Optical Switch Using Silica-Based Planar Lightwave Circuit" IEEE Photonics Technology Letters).

Tsutomu et al. teaches an interferometer optical switch (e.g., fig. 1, Abstract) comprising an optical waveguide circuit including: a first optical multi/demultiplexing

device (e.g., 3dB WINC to the left of the main phase shifter in fig. 1); an optical delay line (e.g., the line containing the main phase shifter and the line parallel to and directly above the line containing the main phase shifter in fig. 1) including two optical waveguides connected to said first optical multi/demultiplexing device (fig. 1); a second optical multi/demultiplexing device (e.g., 3dB WINC to the right of the main phase shifter/optical-delay-line in fig. 1) connected to said optical delay line; one or more input waveguides connected to said first optical multi/demultiplexing device (fig. 1); one or more output waveguides connected to said second optical multi/demultiplexing device (fig. 1); and a phase shifter installed in said optical delay line (e.g., see "main phase shifter" in fig. 1), and wherein at least one of said first optical multi/demultiplexing device and said second optical multi/demultiplexing device is a phase generating coupler, which produces a wavelength-dependent phase difference (e.g., fig. 1; see page 735 the 1st full paragraph in col. 2); and wherein assuming that .lamda. is the wavelength, 2.pi..phi..sub.1(.lamda.) is the phase produced by the first optical multi/demultiplexing device, 2.pi..phi..DELTA..sub.L(.lamda.) is the phase difference of the optical delay line with an optical path length difference of .DELTA.L, and 2.,pi..phi..sub.2(.lamda.) is the phase produced by the second optical multi/demultiplexing device, the phase produced by the first and second optical multi/demultiplexing device and the optical path length difference .DELTA.L is set such that the sum of the phase difference 2.pi.{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda- .)} becomes wavelength insensitive (e.g., fig. 1; see page 735 the 1st full paragraph in col. 2).

The sum "{.phi..sub.1(.lamda.)+.phi..DELTA..sub.L(.lamda.)+.phi..sub.2(.lamda.)}" stated in the paragraph above is inherent to Tsutomu et al. since Tsutomu et al. teaches, in reference to Tsutomu et al.'s figure 1, a wavelength insensitive device at least by stating the "wavelength dependence can be compensated for by operating two subphase shifters" in the 1st full paragraph in col. 2 on page 735. Furthermore Tsutomu et al. figure 1 teaches substantially identical structure to at least figure 1 in the instant Application (IA) at least as is delineated above. (See MPEP 2112.01 re: inherency). Since the claimed and prior art products are identical or substantially identical in structure or composition (e.g., as delineated above)...a prima facie case of .... anticipation ... has been established. (See MPEP 2112.01 re: inherency). Thus claim 2 is met.

It is noted that the reasoning for why inherency exists in the Tsutomu et al. reference is that one of ordinary skill realizes that the structure presented by the Tsutomu et al. reference enables the performance of all of the functions and/or the demonstration of all the properties stated in the claim mentioned above and in all the remaining claims. For example, the two WINCs along with the main phase shifter region configuration of Tsutomu et al. fig. 1 enable the control of the phase such that the properties/functions claimed exist in and/or are performed by the Tsutomu et al. device.

One of ordinary skill recognizes that the claimed functions/parameters are necessarily present in the disclosure of Tsutomu et al.

Regarding claim 85, although Tsutomu et al. does not explicitly mention "cascading" it would have been obvious to do so because it is conventionally known in the art to cascade a (large) number of Mach Zehnder interferomenter (MZI) optical switches for the purpose of creating a larger switching matrix.

Thus claim 85 is rejected.

Furthermore, taking into account the above statement that it is conventionally known in the art to cascade a (large) number of Mach Zehnder interferomenter (MZI) optical switches for the purpose of creating a larger switching matrix, the below rejections of claims 87 and 89 logically follow.

Tsutomu et al. inherently teaches an interferometer optical switch comprising an optical circuit having a plurality of interferometer optical switches as defined in claim 2 connected in cascade, wherein a first interferometer optical switch having two output waveguides; one of the said output waveguides is connected to the input waveguide of a second interferometer optical switch; the other output waveguide of said first interferometer optical switch is used as the second output port of said optical circuit; the input waveguide of said first interferometer optical switch is used as the input port of said optical circuit; and the output waveguide of said second interferometer optical switch is used as the first output port of said optical circuit. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01].

Furthermore, although Tsutomu et al. does not explicitly mention that the switches are "connected in cascade" it would have been obvious to do so because it is conventionally known in the art to cascade a (large) number of Mach Zehnder interferomenter (MZI) optical switches for the purpose of creating a larger switching matrix.

Thus claim 87 is rejected.

Tsutomu et al. inherently teaches an interferometer optical switch comprising an optical circuit having a plurality of interferometer optical switches as defined in claim 2, wherein a first interferometer optical switch having two output waveguides; one of the said output waveguides is connected to the input waveguide of a second interferometer optical switch; the other output waveguide of said first interferometer optical switch is connected to the input waveguide of a third interferometer optical switch; the input waveguide of said first interferometer optical switch is used as the input port of said optical circuit; the output waveguide of said second interferometer optical switch is used as the first output port of said optical circuit; and the output waveguide of said third interferometer optical switch is used as the second output port of said optical circuit. [E.g., fig. 1; see pages 735-736 the "II. WINS Design" section & "III. Experiments"]. Since the structure recited in the Tsutomu et al. reference is substantially identical to that of the claim(s), the claimed properties or functions are presumed to be inherent [MPEP 2112.01].

Furthermore, although Tsutomu et al. does not explicitly mention that the switches are "connected in cascade" it would have been obvious to do so because it is

conventionally known in the art to cascade a (large) number of Mach Zehnder interferomenter (MZI) optical switches for the purpose of creating a larger switching matrix.

Thus claim 89 is rejected.

Regarding claim 91, although Tsutomu et al. does not explicitly mention an MxN switch matrix it would be obvious for one of ordinary skill in the art at the time the invention was made to create an MxN optical switch matrix because it is conventionally known in the art to create of switch matrix for the purpose of obtaining a greater switching capacity (fig. 1). Thus claim 91 is rejected.

Regarding claim 97, although Tsutomu et al. does not explicitly mention a thin film heater formed near an adiabatic groove on the optical waveguide it would have been obvious to do so because it is conventionally known to have a thin film heater formed near an adiabatic groove on the optical waveguide for interferometers for the purpose of allowing the heaters to more effectively heat the optical waveguide (fig. 1). Thus claim 97 is rejected.

Regarding claim 101, although Tsutomu et al. does not explicitly mention wherein said interferometer optical switch has birefringent index adjustment means on its optical waveguide, or undergoes adjustment of a birefringent index it would have been obvious to do so because it is conventionally known for an interferometer optical switch to have birefringent index adjustment means on its optical waveguide for the purpose of allowing more versatile operation of the interferometer (e.g., it is not as necessary to

adjust the polarization direction of the optical signal relative to the substrates) [fig. 1]. Thus claim 101 is rejected.

Regarding claim 103, although Tsutomu et al. does not explicitly mention "an optical module comprising a module including within it an interferometer optical switch as defined in claim 2, and optical fibers that are held by said module for inputting and outputting a signal to and from said interferometer optical switch" it would have been obvious to do so because it is conventionally known interferometer switch in a module and it is also conventionally known fo input and output signal fibers to be held to a module for the purpose of maintaining efficient/consistent coupling (fig. 1). Thus claim 103 is rejected.

Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on 11/9/07 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Horst (20040071390) is one example of a reference that teaches that it is an often followed approach to cascade MZI switches for the purpose of creating a larger switch matrix. Kawachi et al. (4978188) teaches adiabatic grooves at the waveguide of an optical interferometer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL P. MOONEY whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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